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# Verification System To Reduce The Rate Of Impersonation In An Examination

## INTRODUCTION

Verification is a process or method to substantiate or authenticate something or someone. There are different methods or mode used in a verification system which includes password, identity card verification, iris or retina recognition, voice recognition, fingerprint recognition, RFID (Radio Frequency Identity) recognition, barcode recognition etc. Example of an implementation of a verification system includes

1. Verification system implemented in an airport to verify passports, visa and tickets
2. Verification system implemented in cinemas or concert to verify tickets
3. Verification system implemented in a facility or building for access control
4. Verification system implemented in exam halls to verify students

## PROBLEM STATEMENT

Different measures has been implemented to reduce the rate of impersonation in any examination but impersonation still occurs. One of the current verification system uses the manual verification of identity card method where the examiner matches the photograph on the identity card with the face of the supposed owner of the identity card. This identity cards can be cloned and the photograph can be changed.

## BACKGROUND TO THE STUDY

This project is based on the fingerprint recognition technology. Fingerprint technology was initiated by a group called "Biometrics". Biometrics refers to an automated method of uniquely identifying a person based on their physiological or behavioral characteristic. These features or characteristics that can be uniquely recognized includes: facial features, fingerprints, iris and retina features, hand veins, voiceprint, handwritten signature, keystroke dynamics and hand geometry. Fingerprints are impression or marks which are usually found on the surface of the fingertips. They are represented by the pattern of ridges and valleys on the surface of a fingertip. The fingerprints are unique and the patterns never changes. Fingerprints are so distinct that an identical twin each have different fingerprint pattern. A fingerprint most time appears as a series of dark lines that represent the high, peaking portion of the friction ridge

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skin, while the valleys between these ridges appears as white space. The fingerprint scanner captures an image of the fingerprint and uses complex fingerprint identification algorithms to either convert the image into a unique "map" of minutiae points or analyze the pattern. Minutiae points are local ridge characteristics that occur at either a ridge bifurcation (split) or a ridge ending (termination).

This technique reads specific fingerprint 'ridge' characteristics and assigns an x/y co-ordinate. A typical biometric fingerprint reader can record in excess of 40 points. Only the data that contains the location of the points of minutiae is stored as a template in the database, not the actual fingerprint image. This scales down the file size to a minimum and helps prevent fraud or hackers from tampering with the data because a fingerprint cannot be recreated from the stored template. According to the Henry Classification system, fingerprint pattern can be classified into 3 major types:

1. Arch: The ridges enter from one side of the finger, rise in the center forming an arc, and then exit the other side of the finger.
2. Loop: The ridges enter from one side of a finger, form a curve, and then exit on that same side.
3. Whorl: Ridges form circularly around a central point on the finger.

## **HARDWARE**

Different sensors can be used in the hardware implementation, examples are optical, capacitive, ultrasound, and thermal which are used for collecting the digital print of a fingertip surface. Optical sensors take an image of the fingerprint, and are the most common sensor today. The capacitive sensor determines each pixel value based on the capacitance measured, made possible because an area of air (valley) has significantly less capacitance than an area of finger (ridge skin). Other fingerprint sensors capture images by employing high frequency ultrasound. Thermal scanners require a swipe of a finger across a surface to measure the difference in temperature over time to create a digital print image.

## **ALGORITHM**

The two main categories of fingerprint matching techniques are minutiae-based matching and pattern matching. Pattern matching simply compares two images to see how similar they are. Pattern matching is usually used in fingerprint systems to detect duplicates. The most widely used recognition technique, minutiae-based matching, relies on the minutiae points described above, specifically the location and direction of each point.

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## LITERATURE REVIEW

### PREVIOUS IMPLEMENTATION

#### RFID BASED ATTENDANCE MANAGEMENT SYSTEM:

RFID-based Systematic Student Attendance Management System” proposed by Hamid HB (2010) tracks students using Radio Frequency Identification System (RFID). It had known that the attendance is needed to be taken in several places like school, college, university, and workplaces. The main objective was concerned about replacing the old traditional attendance system technology with Radio Frequency Identification (RFID) technology. The limitations observed are: i. The system will require the student/employee to bring the RFID cards always with them while they are in class or workplace in order to check-in or check-out for the attendance. ii. If the student lost their card, they may need to go to the office to make a new card which will cause them to pay for the lost as well as waiting for the new card to be generated and pass to them. iii. Impersonation may still occur.

#### BAR CODE SCANNER BASED STUDENT ATTENDANCE SYSTEM

Kizildag M, Basar E, Celikag M, Atasoylu E, Mousavi S (2007) Proposed a system of automated attendance monitoring using Identity Card and Barcode Scanners. The main objective was concerned about replacing the non-automated attendance system with the barcode scanner technology. As proposed, RFID-based technology is sometime too costly to implement into a school since it requires purchasing of certain hardware to implement the system. Comparing RFID-based technology and barcode technology, the barcode technology is cheaper. In the barcode scanner technology, student will be issued a student card for each of them with the barcode displayed on the card for a scanning purpose. Some setbacks observed includes:

1. The system requires the student to have their ID card with the unique barcode displayed on their ID card every time.
2. Impersonation can still occur because anyone can use the card and get verified

#### FINGERPRINT BASED VERIFICATION SYSTEM

In a journal paper of “Wireless Fingerprint Based College Attendance System Using Zigbee Technology” (Talaviya G. et al. , 2013), it had known that the attendance system using fingerprint recognition is more efficient than the manual attendance system since it provides more automation. Hence it's easier to verify and impersonation is reduced because everyone has a unique print identity and hence security level on authentication is increased. A drawback in this system is: i. It was not mentioned in the journal that data can be edited or modified by the

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administrator. That is student data cannot be modified

## **MANUAL IDENTITY CARD VERIFICATION SYSTEM**

“Manual Identity Card Verification at Examination halls” (OAU, 2017), the examiner matches the photograph on the identity card with the face of the supposed owner of the identity card. This system has been strong and consistent but has some challenges which includes

1. It has been a little difficult and time consuming for examiners to check a whole lot of students.
2. Impersonation may still occur.

## **METHODOLOGY**

### **INVESTIGATION OF OTHER EXISTING SYSTEMS**

Existing systems are studied to understand requirements for the development of this model. Awareness of the unconsidered limitation. In establishing a prototype of a fingerprint-based verification system other implemented system will be considered and unconsidered limited of previous implementation will be taken into account to get the requirement the proposed model will meet. I. Hardware to be used in the system includes fingerprint readers, physical connections and also determining whether the server to be used should have special requirements or any PC can be used as server. Selected readers should have the required characteristics that give an efficient and also inexpensive. Some criteria includes:

- (a) Type of scanner used: Scanner is critical part in the system since it specifies the efficiency of fingerprint processing operation and also the expected degree of maintenance required and its cost.
- (b) Fingerprint Scanner Compatibility: The fingerprint scanner to be used should have a high level of compatibility with other computing device in the system.
- (c) Power source: The readers are DC powered either using batteries or AC/DC adapters. For readers use batteries, determination of their lives is essential to prevent system cut-off. For readers operate with AC/DC adapters

### **DESIGN A MODEL TO VERIFY STUDENTS**

The model will be designed using UML diagrams like use case diagram and class diagrams.

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The fingerprint recognition system contains a sensor, minutia extractor and minutia matcher. Optical and semi-conductor sensors are mainly used in fingerprint acquisition system. These sensors are of highly acceptable accuracy and high efficiency except for some cases like if the user's finger is too dirty or dry. To extract a minutia a three step approach is used such as

## PRE-PROCESSING STAGE

Again pre-processing stage is divided in to three sub stages such as:

1. Image enhancement
2. Image binarization
3. Image segmentation

For image enhancement we used two methods such as histogram equalization and Fourier transform. After enhancing the image we need to binarize the image for that we used the locally adaptive threshold method. For image segmentation we preferred a three-step approach such as block direction estimation, segmentation by direction intensity, Region of Interest (ROI) extraction by Morphological operations.

## MINUTIA EXTRACTION

Minutia extraction stage is divided in to two sub stages such as fingerprint ridge thinning and minutia marking. We used iterative parallel thinning algorithm for minutia extraction stage. Ridge thinning is used to eliminate the redundant pixels of the ridges till the ridges are of one pixel wide. The minutia marking uses crossing number concept.

## POST PROCESSING STAGE

For the post processing stage, it has only one sub step that is removal of false minutia. Also a representation for bifurcations is proposed to unify terminations and bifurcation. The minutia matcher determines whether the two minutia sets are from the same finger or not. If the ridges are match well, then the two fingerprint images are aligned and matching is conducted for all remaining minutia.

## IMPLEMENT THE MODEL

The model is implemented using Fingerprint, JavaScript, node. js/php, Wamp/Mongo dB, bio-bridge tool

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1. Fingerprint Reader: Specification Capability Transaction log 120000 Supported connections TCP/IP, RS232, RS485, USB flash disk Sensor Optical sensor Power source AC/DC adapter
  2. WAMP PACKAGE: WAMP is package of independently-created programs installed on computers that use a Microsoft Windows operating system. The interaction of these programs enables dynamic web pages to be served over a computer network, such as the internet or a private network. "WAMP" is an acronym formed from the initials of the operating system (Windows) and the package's principal components namely Apache, MySQL and PHP.

Other programs may also be included in a package, such as phpMyAdmin which provides a graphical user interface for the MySQL. Apache acts as web server. Its main job is to parse any file requested by the browser and display the correct results according to the code within that file. PHP originally stands for "Hypertext Preprocessor". PHP is a widely-used general-purpose scripting language that is especially suited for Web development and can be embedded into HTML. PHP is a scripting language, as opposed to a programming language: PHP was designed to write Web scripts, not standalone applications. PHP scripts run only after an event occurs. An example is when a user clicks an action like save, upload file, submit form etc. PHP is server-side, that is, everything PHP does occurs on the server. A Web server application, like Apache, is required and all PHP scripts must be accessed through a URL (http://-url, for local host-http://localhost/-php file location).

MySQL is the most common used DBMS. When user requests page written in php, Apache server reads the php code that contains MySQL queries and then processes it according to its scripted directions. These queries cause data to be retrieved from MySQL database to be sent to the user through the server. Generally, only a user with administrator privileges can install a WAMP package. This means that these packages cannot be installed to a hosted service but only to a computer to which the user has complete access.

III. Bio-Bridge tool: Bio-Bridge tool is a software development kit supplied with reader used in project. Its main function is to bridge the verification system to the fingerprint scanner, that is, determining method by which data can be extracted from the scanner in readable, clear and unambiguous format, to be transferred to the database and displayed by the interface. In addition to this, this software tool allows operator of the system to prepare the configurations of scanner remotely from the server and also gives capability of extracting and reading logs or reports offline through USB flash disk. Bio-Bridge tool contains a list of functions to perform the required bridging between fingerprint scanner and system.

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